

Tianzhang Cai

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EDUCATION

KTH Royal Institute of Technology

M.Sc. Machine Learning

DD2380 Artificial Intelligence (A), DD2421 Machine Learning (A), ID2222 Data Mining (A), ID2223 Scalable ML & DL (A), DD2434 Advanced ML (B), DD2412 Advanced DL (B), DD2424 DL in Data Science (B), EQ2425 Analysis & Search of Visual Data (B)

Stockholm, Sweden

Sep. 2021 – Oct. 2022

Shanghai Jiao Tong University

B.E. Electrical and Computer Engineering

VV186 Honors Maths II (A+), VE280 Programming & Elem. Data Structures (A), VV285 Honors Maths III (A), VE203 Discrete Maths (A), VE281 Data Structures & Algorithms (A-), VV417 Linear Algebra (A-), VE401 Probabilistic Methods (B+), VE414 Bayesian Analysis (B+)

Shanghai, China

Sep. 2017 – Aug. 2021

EXPERIENCE

KTH Royal Institute of Technology

Research Engineer

EU Celtic Plus Project AI4Green (<https://ai4green.celfinet.com/>):

- Cellular traffic data analysis and modelling based on a DPI dataset provided by Swedish mobile operator Tele2.
- Multi-cell massive MIMO 5G network simulation environment development in Python.
- Multi-agent RL implementation in PyTorch and training on Google Cloud for energy-efficient and cooperative 5G base station sleeping control, achieving 25% more energy saving than today's default symbol-level sleeping mechanism. (<https://github.com/TZTsai/BS-Sleeping-RL>)
- Writing of two papers to be published on IEEE Transactions on Cognitive Communications and Networking.

Stockholm, Sweden

Nov. 2022 – Mar. 2023

DeepWisdom

Machine Learning Engineer Internship

- Tabular and time-series data analysis, preprocessing, and feature engineering.
- AutoML pipeline development, testing, and benchmarking. (<https://github.com/DeepWisdom/AutoSeries2019>)
- Sales prediction using AutoSeries for business clients, achieving 20% better performance than human predictions.

Shenzhen, China

Sep. 2021 – Dec. 2021

KTH Royal Institute of Technology

Graduate Teaching Assistant

TA of ID2222 Data Mining in Autumn 2021.

Stockholm, Sweden

Oct. 2021 – Dec. 2021

Bosch

Bachelor Thesis Student

- Development, training, and benchmarking of different ML models (SVM, RF, GBDT, MLP) to classify different types of food based on their specimen data collected by a Bosch BME688 gas sensor.
- The best model (PyTorch MLP) achieved a 10% better performance than the ML model in Bosch AI Studio and was deployed on a BME688 development board to provide real-time odor recognition.

Shanghai, China

May. 2021 – Aug. 2021

PROJECTS

Synthcity: an Open-Source Synthetic Data Library

2023

One of the major contributors of Synthcity – a library for generating and evaluating synthetic tabular data maintained by the van der Schaar Lab at the University of Cambridge (<https://github.com/vanderschaarlab/synthcity>).

Traffic Analysis and Multi-Agent RL for Energy-Efficient Base Station Control

KTH, 2022

(Master Thesis) Cell classification and traffic modelling of different scenarios like rural, urban, office, etc. Cooperative base station control using a multi-agent deep RL algorithm (MAPPO) in multi-cell 5G networks to optimize energy efficiency while preserving quality of service (<https://github.com/TZTsai/master-thesis-project>).

Scalable Deep Reinforcement Learning for Automatic Stock Trading

KTH, 2022

(ID2223 Scalable Machine Learning) Development of a distributed deep RL algorithm IMPALA for automatic stock trading. The stock trading was simulated in the [FinRL](#) environment based on [Yahoo Finance](#) data and the RL agent was trained by a multi-CPU compute engine on Google Cloud, achieving 50% less training time and 10% higher profit return than the best-performance RL agent (SAC) in FinRL. (<https://github.com/TZTsai/ID2223-Labs/tree/master/project>)

SKILLS

Computer:

- **Programming Languages:** Python (proficient), C/C++ (intermediate), MATLAB (intermediate), JavaScript, Java, C#, Julia, Scala, R, Mathematica.
- **Data Analytics:** NumPy (proficient), Pandas (proficient), SQL (intermediate), Xarray, Dask, Matplotlib, Plotly.
- **Machine Learning:** Scikit-learn (proficient), PyTorch (intermediate), TensorFlow (intermediate), PySpark, Ray, H2O, Hugging Face, OpenCV, OpenAI Baselines, Stable Baselines, Darts, Sktime, Prophet.
- **Web:** HTML/CSS (intermediate), Flask, BeautifulSoup, Selenium, Scrapy.
- **Others:** Linux/WSL, Git, GitHub, Docker, Google Cloud Platform, Microsoft Azure, Kubernetes, Unity, PowerPoint, Excel, LaTeX.

Mathematics:

Linear Algebra, Probabilistic Methods and Statistics, Calculus and Differential Equations, Cryptography.

Project Management:

Agile Development, Scrum, Jira, Confluence.